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REPORT NO. DOT-TSC-NHTSA-80-9

DOT-HS-805-220

PERFORMANCE CHARACTERISTICS
OF 1977 FORD 300 CID ENGINE

DEPARTMENT OF
TRANSPORTATION

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Joseph Boziuk

U.S. DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
Transportation Systems Center
3 Cambridge MA 02142



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FINAL REPORT

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Technical Report Documentation Page

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PREFACE

This report was prepared under PPA HS027, Research and Analysis in Automotive Fuel Economy and Related Areas, sponsored by the Technology Assessment Division of the National Highway Traffic Safety Administration. It presents the results of laboratory testing of the 1977 Ford 300 CID engine to determine fuel economy and emissions over a sufficient speed-load range to effectively map the engine.

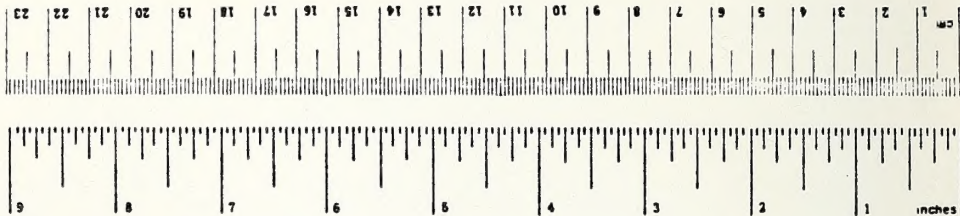
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
km	kilometers	1.1	yards	yd
		0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.6	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
m ³	cubic meters	0.26	gallons	gal
m ³	cubic meters	36	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see RWP, Metric, Page 286, Units of Weights and Measures, Page 52-55, SD Catalog No. C1310-286.

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1. INTRODUCTION

The purpose of the study was to obtain engine performance data for estimating fuel economy and emissions for varied engine service and duty. This work supports the data base of the VEHSIM (Vehicle Simulator) Computer program at the Transportation Systems Center (TSC).

The data presented in this report are for a 6-cylinder spark ignition 1977 Ford 300 CID engine with a catalytic converter, EGR, manifold preheated air inlet system, alternator (driven only, no output) and fan. The engine as equipped is intended for use in a forty-nine state (Federal) vehicle with automatic transmission. The test results present steady-state data sufficient to map the engine for fuel economy and emissions (carbon monoxide, hydrocarbons, and oxides of nitrogen) over the entire operating range of the engine.

2. ENGINE TEST REPORT

The engine test set-up included a complete mean tolerance engine (SAE definition) coupled to Schenck eddy-current dynamometer capable of absorbing 180 horsepower and 250 lb-ft of torque. The alternator was included but not wired into the engine's electrical system. The engine was also equipped with a catalytic converter, EGR, fan, and preheated air inlet system.

The manufacturer's specifications for the engine are given in Table 1.

TABLE 1. MANUFACTURER'S ENGINE SPECIFICATIONS

Year	1977
Manufacturer	Ford Motor Company
Displacement	300 CID
No. Cylinders	6
Maximum Horsepower	119 BHP @ 3000 RPM
Maximum Torque	223 lb - ft @ 1600 RPM
Carburetor	1 V
Bore and Stroke	4.00 in. x 3.98 in.
Compression Ratio	7.9

Emissions instrumentation consisted of the following Beckman Instruments Corp. instruments.

CO	Model 864 Infrared Analyzer (NDIR)
CO ₂	Model 864 Infrared Analyzer (NDIR)
NO/NO _x	Model 951 Chemiluminescent Detector
O ₂	Model F3 Paramagnetic Analyzer
HC	Model 402 Flame Ionization Detector

Prior to testing, the engine break-in consisted of following the schedule shown in Table 2. A single batch of unleaded gasoline was used for break-in and engine testing. The gasoline specifications are shown in Table 3.

TABLE 2. ENGINE BREAK-IN SCHEDULE

PROGRAM 1:	<u>MPH</u>	<u>RPM</u>	<u>DURATION (MINUTES)</u>
	20	935	4
	40	1290	4
	60	1935	4
	50	1615	4
	30	970	4

(37 Cycles for an Accumulated 500 Miles)

PROGRAM 2:	<u>MPH</u>	<u>RPM</u>	<u>DURATION (MINUTES)</u>
	40	1290	4
	60	1935	4
	70	2260	4
	60	1935	4
	70	2260	4
	65	2100	4
	55	1775	4

(36 Cycles for an Accumulated 1500 Miles)

TABLE 3. FUEL SPECIFICATIONS

<u>TYPE</u>	<u>AMCO INDOLINE</u>
Specific gravity @ 60°F	0.7416
Percent Carbon	85.34
Percent Hydrogen	14.32

During the steady-state test, the engine was operated at the following speed-load modes:

<u>SPEED-RPM</u>	<u>LOADS-TORQUE</u>
735	0 0%, 10%, 20%, 30%, 40%, 55%, 70%, 85%, 100% WOT Torque
1000	
1200	
1600	
2000	
2500	
3000	

Each test point was duplicated and the following data were recorded for each:

Ambient Pressure, mm Hg
Ambient Temperature, °F
Ambient Relative Humidity, %
Engine Speed, RPM
Torque, lb-ft.
Accumulated Fuel, cc (Fluidyne model 1250)
Ignition Timing, °BTDC
Manifold Vacuum, inches Hg
Throttle Angle, degrees
Oil Pump Exit Pressure, psi
Oil Temperature, °F
Coolant Exit Temperature, °F
Exhaust Temperature Before Catalyst, °F
Exhaust Pressure Before Catalyst, inches H₂O
Emissions Concentrations After Catalyst, dry basis:
CO, %
CO₂, %
HC, ppm
NO_x, ppm
Exhaust Temperature After Catalyst, °F.

The following equations were used in calculating corrected torque, corrected horsepower, mass fuel flow rate, corrected brake specific fuel consumption, air-to-fuel ratio based on emissions, mass emission rates of CO, HC, NO_x, and ambient absolute humidity.

CORRECTED TORQUE, T_c (lb-ft)⁽¹⁾ From SAE J245, Spark Ignition Engine Rating Code, adjusted to standard SAE ambient conditions:

$$T_c = \frac{B_d^*}{B_{dt}} \left(\frac{t_t + A}{t^* + A} \right)^{1/2} T_t$$

where

- B_d^* = Standard Dry Barometric Pressure (29.00 in Hg, 97.9 kPa)
- B_{dt} = Dry Barometric Pressure at Test Conditions
- t_t = Ambient Air Temperature at Test Conditions
- t^* = Standard Ambient Temperature (85°F, 29.4°C)
- A = Absolute Temperature Constant (460°R, 273°K)
- T_t = Measured Torque at Test Conditions.

CORRECTED HORSEPOWER, hpc ⁽¹⁾ From SAE J245, Spark Ignition Engine Rating Code, adjusted to standard SAE ambient conditions:

$$hp_c = \frac{T_c N}{G}$$

where

- T_c = Corrected Torque (See Above)
- N = Engine Speed (RPM)
- G = Power Constant (5252 English, 955 SI).

⁽¹⁾Engines with manifold preheated air inlet systems are designed to control carburetor air inlet temperature to a specific temperature. Excursions in ambient temperature below this value do not appreciably affect the controlled temperature. The engine performance correction factor as described in SAE J245 Engine Rating Code for Spark Ignition Engines has therefore been updated as follows: If ambient temperature is less than or equal to the manufacturer's stated controlled temperatures, no correction component involving carburetor inlet temperature is made. If ambient temperature exceeds the targeted controlled temperature, the normal J245 correction factor is applied with the targeted controlled temperature used in place of the standard ambient temperature.

MASS FUEL FLOW RATE (lb/hr) From volumetric measurement (corrected to 60°F per ASTM petroleum tables) and fuel specific gravity:

$$\dot{m}_f = \frac{(\text{SpG})_f \left(\frac{1 \text{ lb H}_2\text{O}}{\text{vol}} \right) (\text{vol})_f}{\Delta t_T}$$

where

$$\begin{aligned} \dot{m}_f &= \text{Fuel Flow Rate lb/hr} \\ (\text{SpG})_f &= \text{Specific Gravity of Fuel} \\ (1 \text{ lb H}_2\text{O}/\text{vol}) &= \text{Pounds of Water per Unit Volume} \\ (\text{vol})_f &= \text{Volume of Fuel Measured, corrected to 60°F per ASTM petroleum tables} \\ \Delta t_T &= \text{Time Interval of Volume Measurement (hrs)}. \end{aligned}$$

CORRECTED BRAKE SPECIFIC FUEL CONSUMPTION (BSFC) (lb/HP-Hr)

$$\text{BSFC}_c = \frac{\dot{m}_f}{\text{HP}_c}$$

where

$$\begin{aligned} \text{BSFC}_c &= \text{Corrected Brake Specific Fuel Consumption} \\ \text{HP}_c &= \text{Corrected Horsepower} \\ \dot{m}_f &= \text{Mass Fuel Flow Rate (lb/hr)}. \end{aligned}$$

AIR/FUEL RATIO (A/F) Based on emissions measurements from SPINDT, SAE #650507:

$$A/F = F_b \left[11.492 F_c \left(\frac{1+R/2+Q}{1+R} \right) + \left(\frac{120(1-F_c)}{3.5+R} \right) \right]$$

where

$$\begin{aligned} R &= \frac{\% \text{ CO}}{\% \text{ CO}_2} = \frac{\text{Percent CO Concentration}}{\text{Percent CO}_2 \text{ Concentration}} \\ F_c &= \text{Mass Fraction of Carbon in Fuel} \\ F_b &= \frac{\% \text{ CO} + \% \text{ CO}_2}{\% \text{ CO} + \% \text{ CO}_2 + \% \text{ CH}} \\ Q &= \frac{\% \text{ O}_2}{\% \text{ CO}_2} = \frac{\text{Percent O}_2 \text{ Concentration}}{\text{Percent CO}_2 \text{ Concentration}} \end{aligned}$$

CARBON MONOXIDE (CO) MASS EMISSION RATE (Grams/Hr)

$$\text{MASS CO} = (4.383) (\dot{m}_f) (A/F+1) (\% \text{ CO}) \left[\frac{1}{1 + 0.03148 (\% \text{ CO}_2) \frac{\% \text{ CO} + \% \text{ CO}_2}{\% \text{ CO} + 3\% \text{ CO}_2}} \right]$$

where

- \dot{m}_f = Mass Fuel Flow Rate
A/F = Air to Fuel Ratio
% CO = Percent CO Concentration
% CO₂ = Percent CO₂ Concentration .

HYDROCARBON (HC) MASS EMISSION RATE (Grams/Hr)

$$\text{Mass HC} = (0.0002207) (\dot{m}_f) (A/F+1) (\text{ppm HC})$$

where

- \dot{m}_f = Mass Fuel Flow Rate
A/F = Air to Fuel Ratio
ppm HC = Parts per Million of HC Concentration.

OXIDES OF NITROGEN (NO_x) MASS EMISSIONS RATE (Gram/Hr)

$$\text{Mass NO}_x = 0.007201 (\dot{m}_f) (A/F+1) (\text{ppm NO}_x) \left[\frac{1}{1 + .03148 (\% \text{ CO}_2) \left(\frac{\% \text{ CO} + \% \text{ CO}_2}{\% \text{ CO} + 3\% \text{ CO}_2} \right)} \right]$$

where

- \dot{m}_f = Mass Fuel Flow Rate
A/F = Air to Fuel Ratio
ppm NO_x = Parts per Million NO_x Concentration
% CO = Percent CO Concentration
% CO₂ = Percent CO₂ Concentration
K_H = Humidity Correction Factor .

HUMIDITY CORRECTION FACTOR

$$K_H = \frac{1}{1 - .0047 (\text{Absolute Humidity} - 75)}$$

where absolute humidity is in grams/pound of dry air.

ABSOLUTE HUMIDITY (AH) (Grains/Lb Dry Air):

$$AH = \frac{(RH) P_{SU}}{1.608 (P_{AMB} - RH \cdot P_{SU})}$$

where

- RH = Measured Relative Humidity
P_{SU} = Saturated Vapor Pressure (from Keenan and Keyes Steam Tables)
P_{AMB} = Ambient Barometric Pressure.

3. DISCUSSION OF TEST RESULTS

Appendixes A and B summarize engine map data in tabular and graphical form, respectively. Each test point is repeated once. Fuel consumption, hydrocarbon mass rates, and oxides of nitrogen mass rates demonstrated excellent repeatability. Air-to-fuel rates, however, were not very repeatable below 1600 RPM.

APPENDIX A TABULAR SUMMARY OF ENGINE MAP DATA

FORE 300 CID					
Engine.....	1	2	3	4	5
Test Number.....	6/20/77	6/20/77	6/20/77	6/20/77	6/20/77
Test Date.....	7/19/77	7/19/77	7/19/77	7/19/77	7/19/77
Barometer, mm Hg.....	759.0	765.0	758.4	758.4	757.9
Humidity, grains/lb.....	52.	81.	48.	50.	49.
Ambient temperature, F....	76.	75.	77.	77.	78.
Engine speed, rpm.....	735.	735.	1000.	1000.	1000.
Torque, lb-ft.....	0.1	0.1	19.7	42.1	63.8
Power, bhp.....	0.0	0.0	3.7	8.0	12.2
Fuel rate, lb/hr.....	4.3	4.2	5.3	5.9	7.3
Ignition timing, deg BTC..	23.0	20.0	23.0	30.0	29.5
Manifold vacuum, in Hg....	-22.0	-22.2	-22.2	-19.4	-16.3
Throttle angle, deg.....	0.0	0.0	3.5	5.0	8.0
Brake specific fuel const.*	*****	241.800	1.419	0.738	0.555
Oil temperature, F.....	189.	192.	195.	200.	202.
Oil pressure, psi.....	43.	50.	52.	52.	51.
Coolant temperature, F.....	195.	214.	199.	192.	194.
Before Catalyst					
Exhaust temperature, F....	434.	431.	617.	700.	749.
Exhaust pressure, in H2O..	1.3	1.3	0.4	1.5	2.9
After Catalyst					
Concentrations, dry basis:					
CO, %.....	4.605	4.393	4.701	0.025	0.022
CO2, %.....	7.64	8.66	8.95	11.58	10.93
O2, %.....	5.95	4.10	4.02	4.56	5.59
HC, ppmC.....	9201.	12940.	9855.	105.	92.
NOx, ppm.....	14.	17.	35.	1500.	1752.
Air-fuel ratio.....	15.73	14.17	14.23	18.53	19.69
Emission rates, q/hr:					
CO.....	1326.	1087.	823.	11.	13.
HC.....	147.7	180.1	84.0	2.7	3.1
NOx**.....	0.7	0.7	7.9	111.7	170.0
Exhaust temperature, F....	1093.	1086.	696.	698.	725.

* Corrected - SAN J245 Spark Ignition engine rating code

** Corrected for humidity

Engine..... FORC 300 CID

Test Number.....	6	7	9	10	62	63
Test Date.....	6/20/77	6/20/77	6/21/77	6/21/77	7/19/77	7/1/77
Barometer, in Hg.....	757.9	757.7	757.7	757.7	764.0	759.5
Humidity, grains/lb.....	48.	46.	56.	56.	84.	71.
Ambient temperature, F....	78.	80.	78.	78.	80.	78.
Engine speed, rpm.....	1000.	1000.	1000.	1000.	1000.	1000.
Torque, lb-ft.....	85.5	117.0	149.3	180.4	0.1	20.4
Power, bhp.....	16.3	22.3	28.5	34.2	0.0	3.9
Fuel rate, lb/hr.....	8.6	11.1	14.1	19.6	4.8	5.5
Ignition timing, deg BTDC..	27.0	32.0	13.0	11.5	21.5	40.0
Manifold vacuum, in Hg....	-13.7	-9.3	-7.8	-3.3	-23.6	-21.4
Throttle angle, deg.....	10.0	14.0	17.5	26.0	1.5	5.0
Brake specific fuel cons..	0.526	0.497	0.497	0.574	200.200	1.425
Oil temperature, F.....	204.	206.	210.	212.	196.	198.
Oil pressure, psi.....	51.	50.	51.	50.	55.	55.
Coolant temperature, F....	205.	198.	209.	206.	214.	202.
Before Catalyst						
Exhaust temperature, F....	808.	971.	1013.	1077.	540.	631.
Exhaust pressure, in H2O..	4.6	8.0	10.4	15.4	0.9	1.0
After Catalyst						
Concentrations, dry basis:						
CO, %.....	0.033	0.025	1.603	4.880	4.331	2.677
CO2, %.....	10.82	11.68	11.17	9.28	10.97	13.02
O2, %.....	5.61	4.46	3.83	3.78	0.43	0.25
HCl, ppmC.....	84.	85.	1317.	1724.	10200.	3673.
NOx, ppm.....	1783.	1549.	1548.	506.	51.	169.
Air-fuel ratio.....	19.75	18.42	16.66	14.80	12.33	13.50
Emission rates, g/hr:						
CO.....	23.	21.	1557.	5889.	1055.	813.
HC.....	3.3	4.1	72.6	118.0	142.9	64.8
NOx.....	205.4	213.8	247.0	100.3	2.1	8.4
Exhaust temperature, F....	777.	930.	965.	1024.	813.	660.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

Engine..... POB 300 CID

	64	65	66	67	68	69
Test Number.....	7/ 1/77	7/18/77	7/ 1/77	7/18/77	7/ 1/77	7/ 1/77
Test Date.....						
Barometer, in Hg.....	759.5	764.3	759.5	764.3	759.2	759.2
Humidity, grains/lb.....	71.	63.	75.	89.	79.	82.
Ambient temperature, F....	78.	77.	79.	81.	80.	82.
Engine speed, rpm.....	1000.	1000.	1000.	1000.	1000.	1000.
Torque, lb-ft.....	44.2	63.0	87.0	116.7	151.2	183.1
Power, bhp.....	8.4	12.1	16.6	22.4	28.7	35.0
Fuel rate, lb/hr.....	6.3	7.4	9.0	11.8	16.1	19.8
Ignition timing, deg BTDC..	40.0	20.0	28.0	16.0	8.0	6.0
Manifold vacuum, in Hg.....	-18.5	-16.1	-11.8	-8.8	-5.9	-2.4
Throttle angle, deg.....	7.0	8.0	12.0	15.5	20.5	31.0
Brake specific fuel const.	0.752	0.609	0.544	0.527	0.561	0.565
Oil temperature, F.....	200.	201.	198.	201.	203.	206.
Oil pressure, psi.....	55.	55.	55.	55.	54.	54.
Coolant temperature, F.....	206.	198.	213.	212.	213.	206.
Before Catalyst						
Exhaust temperature, F....	707.	790.	862.	987.	1059.	1089.
Exhaust pressure, in H2O..	2.0	3.3	5.5	8.5	12.0	15.5
After Catalyst						
Concentrations, dry basis:						
CO, %.....	0.030	0.031	0.029	0.035	3.829	4.005
CO2, %.....	13.89	13.09	12.91	13.94	12.53	11.54
O2, %.....	1.32	2.41	2.59	1.25	0.11	0.15
HC, ppmC.....	152.	77.	63.	54.	1219.	1466.
NOx, ppm.....	1549.	1806.	1460.	1694.	959.	955.
Air-fuel ratio.....	15.67	16.55	16.72	15.63	13.19	13.03
Emission rates, g/hr:						
CO.....	12.	15.	18.	26.	3311.	4244.
HC.....	3.5	2.2	2.2	2.3	61.3	89.7
NOx**.....	102.5	148.2	148.2	208.8	136.2	166.3
Exhaust temperature, F....	673.	729.	792.	917.	982.	1015.

* Corrected - SAR J245 Spark ignition engine rating code

** Corrected for humidity

FORM 300 CID

Engine.....	70	127	11	12	13	14
Test Number.....	7/ 1/77	7/20/77	6/21/77	6/21/77	6/21/77	6/21/77
Test Date.....	759.2	762.3	757.7	757.7	757.7	757.9
Barometer, mm Hg.....	78.	89.	56.	57.	57.	56.
Humidity, grains/lb.....	81.	83.	78.	78.	78.	78.
Ambient temperature, F.....						
Engine speed, rpm.....	1000.	1000.	1200.	1200.	1200.	1200.
Torque, lb-ft.....	208.6	211.5	0.2	20.9	40.8	63.5
Power, bhp.....	39.7	40.5	0.1	4.7	9.3	14.5
Fuel rate, lb/hr.....	21.5	22.2	5.3	5.9	7.1	8.6
Ignition timing, deg BTC.....	6.0	8.0	26.0	32.0	34.0	33.0
Manifold vacuum, in Hg.....	-0.2	-0.2	-24.4	-22.6	-20.1	-17.3
Throttle angle, deg.....	80.0	80.0	3.0	5.0	7.0	10.0
Brake specific fuel const.....	0.541	0.549	94.280	1.247	0.759	0.595
Oil temperature, F.....	207.	207.	199.	200.	202.	204.
Oil pressure, psi.....	53.	54.	56.	56.	56.	56.
Coolant temperature, F.....	212.	213.	199.	198.	195.	195.
Before Catalyst						
Exhaust temperature, F.....	1120.	1132.	633.	729.	799.	846.
Exhaust pressure, in H2O.....	18.0	18.4	1.0	1.1	2.1	3.7
After Catalyst						
Concentrations, dry basis:						
CO, %.....	3.310	4.258	3.768	0.519	0.031	0.028
CO2, %.....	11.91	11.61	9.70	11.82	11.27	11.03
O2, %.....	0.14	0.19	3.87	3.80	4.88	5.37
HCl, ppmC.....	1448.	1446.	8038.	1672.	78.	65.
NOx, ppm.....	1117.	1271.	47.	354.	1556.	1775.
Air-fuel ratio.....	13.30	12.58	14.77	17.22	18.92	19.44
Emission rates, q/hr:						
CO.....	3892.	5051.	1217.	217.	17.	20.
HC.....	98.3	99.2	147.1	39.7	2.4	2.5
NOx**.....	215.8	247.7	2.5	24.4	141.1	201.3
Exhaust temperature, F.....	1041.	1055.	856.	746.	760.	817.

* Corrected - SAE J245 Spark Ignition engine rating code

** Corrected for humidity

FORD 300 CID

Engine.....	15	16	17	18	19	72
Test Number.....	6/21/77	6/21/77	6/21/77	6/21/77	6/21/77	7/6/77
Test Date.....	757.9	757.9	757.9	757.9	757.9	763.0
Barometer, mm Hg.....	54.	55.	54.	56.	56.	34.
Humidity, grains/lb.....	80.	81.	81.	83.	83.	72.
Ambient temperature, F....						
Engine speed, rpm.....	1200.	1200.	1200.	1200.	1200.	1200.
Torque, lb-ft*.....	85.4	116.8	149.2	182.0	213.1	0.7
Power, bhp*.....	19.5	26.6	34.2	41.6	48.5	0.2
Fuel rate, lb/hr.....	10.2	13.3	16.4	23.3	25.2	5.2
Ignition timing, deg BTC..	29.0	30.0	22.0	21.0	23.0	23.5
Manifold vacuum, in Hg....	-13.8	-9.0	-8.0	-3.6	-0.5	-24.7
Throttle angle, deg.....	13.0	16.0	20.5	29.0	80.0	3.5
Brake specific fuel cons*..	0.524	0.458	0.478	0.561	0.519	32.580
Oil temperature, F.....	205.	210.	214.	215.	218.	200.
Oil pressure, psi.....	56.	55.	55.	54.	54.	56.
Coolant temperature, F....	204.	200.	204.	202.	203.	207.
Before Catalyst						
Exhaust temperature, F....	917.	1047.	1101.	1156.	1212.	584.
Exhaust pressure, in H2O..	6.2	10.1	13.4	21.5	26.7	1.1
After Catalyst						
Concentrations, dry basis:						
CO, %.....	0.029	0.029	0.754	4.553	3.754	4.145
CO2, %.....	11.09	11.63	11.59	9.40	10.10	11.82
O2, %.....	5.19	4.49	3.92	3.77	3.71	0.43
HC, ppmC.....	75.	52.	819.	1419.	1305.	7804.
NOx, ppm.....	1620.	1304.	1696.	679.	1013.	67.
Air-fuel ratio.....	19.26	18.46	17.30	15.00	15.38	12.69
Emission rates, g/hr:						
CO.....	23.	29.	879.	6607.	6004.	1125.
HC.....	3.4	3.0	54.1	116.8	118.7	122.7
NOx**.....	216.8	216.1	324.7	161.9	266.2	3.0
Exhaust temperature, F....	879.	1013.	1065.	1099.	1149.	850.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

Engine..... FORD 300 CID

Test Number.....	73	74	75	76	77	78
Test Date.....	7/ 6/77	7/ 6/77	7/ 6/77	7/ 6/77	7/ 6/77	7/ 6/77
Barometer, in Hg.....	762.8	762.8	762.8	762.8	762.8	762.3
Humidity, grains/lb.....	35.	35.	36.	36.	39.	39.
Ambient temperature, F....	72.	73.	73.	75.	77.	76.
Engine speed, rpm.....	1200.	1200.	1200.	1200.	1200.	1200.
Torque, lb-ft.....	20.3	41.5	63.0	83.6	113.8	146.7
Power, bhp.....	4.6	9.5	14.2	19.1	25.9	33.5
Fuel rate, lb/hr.....	6.1	7.2	8.8	10.3	13.4	16.2
Ignition timing, deg FTC..	33.0	34.0	34.0	28.0	20.0	15.0
Manifold vacuum, in Hg....	-22.9	-20.1	-17.3	-14.2	-9.3	-8.2
Throttle angle, deg.....	5.5	8.5	10.5	13.5	18.5	21.0
Brake specific fuel const..	1.319	0.767	0.619	0.541	0.517	0.484
Oil temperature, F.....	201.	202.	203.	204.	206.	200.
Oil pressure, psi.....	56.	56.	56.	56.	56.	57.
Coolant temperature, F....	211.	207.	204.	206.	199.	205.
Before Catalyst						
Exhaust temperature, F....	712.	790.	848.	928.	1058.	1121.
Exhaust pressure, in H2O..	1.1	2.0	3.5	5.7	10.1	13.3
After catalyst						
Concentrations, dry basis:						
CO, %.....	0.934	0.027	0.031	0.030	0.030	0.433
CO2, %.....	13.77	13.67	13.20	13.18	13.66	14.16
O2, %.....	0.38	1.62	2.41	2.16	1.44	0.24
HC, ppmC.....	2144.	88.	73.	61.	44.	216.
NOx, ppm.....	498.	1559.	1647.	1581.	1421.	1036.
Air-fuel ratio.....	14.40	15.91	16.53	16.36	15.79	14.72
Emission rates, g/hr:						
CO.....	333.	13.	19.	21.	25.	420.
HC.....	44.3	2.4	2.5	2.4	2.2	12.1
NOx.....	29.2	120.3	160.5	179.3	201.2	164.9
Exhaust temperature, F....	729.	739.	797.	861.	996.	1073.

* Corrected - SAE J245 Spark Ignition engine rating code

** Corrected for humidity

POBD 300 CID

Engine.....	79	7/ 6/77	7/ 6/77	80	7/18/77	6/24/77	23	24
Test Number.....								
Test Date.....								6/24/77
Barometer, mm Hg.....	762.3			762.3	764.3	765.6	765.8	765.8
Humidity, grains/lb.....	41.			44.	96.	52.	55.	57.
Ambient temperature, F....	77.			77.	82.	78.	79.	80.
Engine speed, rpm.....	1200.			1200.	1600.	1600.	1600.	1600.
Torque, lb-ft.....	179.5			215.9	0.8	22.3	43.2	66.5
Power, bhp.....	40.8			49.1	0.2	6.8	13.1	20.3
Fuel rate, lb/hr.....	23.4			25.7	6.2	7.8	9.9	12.2
Ignition timing, deg FIC..	8.0			8.0	40.0	39.0	40.0	36.0
Manifold vacuum, in Hg....	-4.2			-0.6	-24.8	-21.9	-17.9	-14.5
Throttle angle, deg.....	29.0			80.0	5.0	8.5	11.0	15.0
Brake specific fuel cons*.	0.572			0.524	28.240	1.146	0.753	0.601
Oil temperature, F.....	208.			213.	205.	205.	211.	213.
Oil pressure, psi.....	55.			55.	58.	49.	48.	48.
Coolant temperature, F....	203.			201.	208.	209.	210.	207.
Before Catalyst								
Exhaust temperature, F....	1163.			1234.	800.	806.	867.	926.
Exhaust pressure, in H2O..	20.1			26.2	2.1	3.5	5.5	8.2
After Catalyst								
Concentrations, dry basis:								
CO, %.....	3.360			4.252	0.060	0.030	0.029	0.030
CO2, %.....	11.25			12.13	14.29	10.83	10.78	11.13
O2, %.....	0.15			0.32	0.43	5.66	5.74	5.28
HC, ppm.....	1467.			1335.	211.	60.	62.	68.
NOx, ppm.....	748.			1367.	216.	1125.	797.	1036.
Air-fuel ratio.....	13.22			13.13	15.02	19.80	19.89	19.32
Emission rates, g/hr:								
CO.....	4293.			5872.	23.	19.	24.	29.
HC.....	107.5			107.1	4.6	2.1	2.8	3.7
NOx**.....	157.0			310.1	13.4	117.6	106.5	165.4
Exhaust temperature, F....	1085.			1146.	864.	763.	837.	894.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

FOBE 300 CID

Engine.....	25	26	28	29	30	7/ 6/77
Test Number.....	6/24/77	6/24/77	6/27/77	7/19/77	7/19/77	7/ 6/77
Test Date.....	765.6	765.6	765.8	764.8	764.8	762.3
Barometer, in Hg.....	57.	56.	73.	84.	84.	43.
Humidity, grains/lb.....	82.	82.	83.	83.	85.	76.
Ambient temperature, F....						
Engine speed, rpm.....	1600.	1600.	1600.	1600.	1600.	1600.
Torque, lb-ft.....	88.6	120.0	154.4	186.3	217.5	0.9
Power, bhp.....	27.1	36.7	46.9	56.7	66.3	0.3
Fuel rate, lb/hr.....	14.6	18.4	22.2	31.4	34.3	6.2
Ignition timing, deg BTC..	30.0	28.0	36.0	13.0	12.0	38.5
Manifold vacuum, in Hg....	-11.0	-8.3	-7.5	-4.4	-0.9	-25.3
Throttle angle, deg.....	18.0	22.0	25.0	33.0	80.0	5.5
Brake specific fuel cons*..	0.540	0.502	0.473	0.553	0.518	27.280
Oil temperature, F.....	215.	219.	220.	218.	221.	204.
Oil pressure, psi.....	48.	48.	56.	56.	56.	58.
Coolant temperature, F.....	206.	204.	206.	207.	208.	210.
Before Catalyst						
Exhaust temperature, F....	1002.	1105.	1224.	1235.	1285.	762.
Exhaust pressure, in H2O..	11.8	17.6	25.9	34.6	43.4	1.5
After Catalyst						
Concentrations, dry basis:						
CO, %.....	0.026	0.028	0.412	4.352	4.426	6.596
CO2, %.....	11.25	11.86	11.74	11.61	12.03	14.29
O2, %.....	5.04	4.27	3.91	0.01	0.07	0.22
HC, ppmC.....	48.	61.	17.	1261.	1171.	1470.
NOx, ppm.....	1150.	1662.	1848.	1163.	1343.	159.
Air-fuel ratio.....	19.07	18.21	17.64	12.85	12.93	14.52
Emission rates, g/hr:						
CO.....	30.	38.	663.	7213.	8045.	217.
HC.....	3.1	4.7	1.5	120.9	123.7	31.2
NOx**.....	217.1	376.6	488.8	316.7	401.1	9.5
Exhaust temperature, F....	962.	1082.	1219.	1168.	1211.	855.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

POED 300 CID

Engine.....	82	83	85	86	87	88
Test Number.....	7/ 6/77	7/ 6/77	7/ 7/77	7/ 7/77	7/ 7/77	7/ 7/77
Barometer, in Hg.....	761.7	761.5	763.0	763.0	763.0	763.0
Humidity, grains/lb.....	45.	48.	52.	54.	54.	54.
Ambient temperature, F....	78.	78.	78.	78.	76.	77.
Engine speed, rpm.....	1600.	1600.	1600.	1600.	1600.	1600.
Torque, lb-ft.....	21.0	43.2	64.9	87.9	120.6	153.3
Power, bhp.....	6.3	13.2	19.8	26.5	36.9	46.9
Fuel rate, lb/hr.....	7.9	9.7	11.9	14.3	18.5	22.5
Ignition timing, deg BTC..	39.0	40.0	38.5	35.0	22.5	19.0
Manifold vacuum, in Hg....	-22.9	-19.6	-16.6	-13.3	-8.9	-7.7
Throttle angle, deg.....	8.5	11.5	14.5	18.0	22.0	26.5
Brake specific fuel const..	1.253	0.732	0.602	0.541	0.502	0.480
Oil temperature, F.....	206.	207.	208.	211.	211.	214.
Oil pressure, psi.....	57.	57.	56.	55.	56.	55.
Coolant temperature, F.....	209.	208.	210.	207.	206.	206.
Before Catalyst						
Exhaust temperature, F....	877.	937.	984.	1044.	1158.	1224.
Exhaust pressure, in H2O..	2.4	4.7	7.5	11.0	17.2	24.5
After Catalyst						
Concentrations, dry basis:						
CO, %.....	0.027	0.029	0.023	0.032	0.027	0.196
CO2, %.....	13.47	12.96	13.36	13.39	13.94	14.49
O2, %.....	1.73	2.37	2.06	1.76	0.94	0.18
HC, ppmC.....	43.	36.	45.	43.	59.	102.
NOx, ppm.....	1176.	1346.	1498.	1558.	1404.	1643.
Air-fuel ratio.....	16.01	16.55	16.27	16.04	15.41	14.79
Emission rates, q/hr:						
CO.....	14.	19.	18.	30.	31.	265.
HC.....	1.3	1.4	2.0	2.3	3.9	8.0
NOx**.....	100.0	144.6	195.1	240.3	267.6	364.4
Exhaust temperature, F....	803.	876.	934.	987.	1111.	1207.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

Engine..... FORD 300 CID

	89	90	31	32	33	34
Test Number.....	7/ 7/77	7/ 7/77	6/27/77	6/27/77	6/27/77	6/27/77
Test Date.....						
Barometer, mm Hg.....	763.0	763.0	763.5	763.5	763.5	763.8
Humidity, grains/lb.....	53.	64.	70.	72.	73.	74.
Ambient temperature, F....	78.	84.	79.	81.	81.	82.
Engine speed, rpm.....	1600.	1600.	2000.	2000.	2000.	2000.
Torque, lb-ft.....	188.7	223.4	0.3	21.0	41.7	64.0
Power, bhp.....	57.6	67.8	0.1	8.0	15.9	24.3
Fuel rate, lb/hr.....	29.4	34.3	6.7	10.0	12.4	15.2
Ignition timing, deg FIC..	12.0	15.0	42.0	43.0	43.0	38.0
Manifold vacuum, in. Hg....	-4.7	-1.0	-24.9	-21.1	-18.3	-15.1
Throttle angle, deg.....	33.5	80.0	8.5	11.5	15.0	18.0
Brake specific fuel conse.	0.511	0.505	56.470	1.249	0.782	0.625
Oil temperature, F.....	217.	215.	214.	216.	218.	220.
Oil pressure, psi.....	55.	55.	58.	58.	58.	57.
Coolant temperature, F.....	208.	209.	209.	209.	208.	208.
Before Catalyst						
Exhaust temperature, F....	1289.	1309.	836.	924.	958.	1013.
Exhaust pressure, in H2O..	35.1	45.1	2.7	5.1	8.2	12.3
After Catalyst						
Concentrations, dry basis:						
CO, %.....	3.118	4.096	0.025	0.033	0.023	0.028
CO2, %.....	12.77	12.36	11.06	10.96	11.10	11.17
O2, %.....	0.05	0.04	5.42	5.44	5.16	5.16
HC, ppmC.....	1045.	1091.	4.	5.	0.	0.
NOx, ppm.....	1677.	1450.	431.	451.	781.	1149.
Air-fuel ratio.....	13.43	13.05	19.49	19.55	19.25	19.21
Emission rates, g/hr:						
CO.....	5030.	7483.	14.	27.	23.	34.
HC.....	98.0	116.0	0.1	0.2	0.0	0.0
NOx**.....	444.5	435.2	38.0	59.9	126.7	227.3
Exhaust temperature, F....	1227.	1235.	804.	874.	920.	973.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

Engine.....	FORD 300 CID					
Test Number.....	35	36	37	39	40	92
Test Date.....	6/27/77	6/27/77	6/27/77	7/19/77	7/19/77	7/8/77
Barometer, in Hg.....	763.8	762.3	764.0	763.8	763.5	763.5
Humidity, grains/lb.....	74.	75.	76.	87.	85.	62.
Ambient temperature, F....	83.	85.	86.	88.	88.	71.
Engine speed, rpm.....	2000.	2000.	2000.	2000.	2000.	2000.
Torque, lb-ft*.....	83.3	116.1	148.6	181.3	214.8	0.5
Power, bhp*.....	31.8	44.4	56.7	69.2	82.1	0.2
Fuel rate, lb/hr.....	17.9	23.2	29.5	36.0	43.5	7.7
Ignition timing, deg BTC..	35.0	31.0	22.5	14.5	14.0	41.0
Manifold vacuum, in Hg....	-12.2	-8.4	-6.1	-4.9	-1.5	-25.6
Throttle angle, deg.....	21.5	27.0	33.5	37.0	80.0	8.5
Brake specific fuel const*.	0.562	0.522	0.521	0.520	0.530	46.940
Oil temperature, F.....	222.	226.	229.	226.	229.	209.
Oil pressure, psi.....	57.	57.	56.	57.	57.	58.
Coolant temperature, F.....	208.	208.	210.	210.	208.	210.
Before Catalyst						
Exhaust temperature, F....	1075.	1192.	1290.	1370.	1366.	927.
Exhaust pressure, in H2O..	16.7	27.6	41.9	55.2	69.9	3.0
After Catalyst						
Concentrations, dry basis:						
CO, %.....	0.030	0.076	1.162	2.803	4.442	0.034
CO2, %.....	11.52	12.21	11.32	13.18	12.16	13.81
O2, %.....	4.64	3.67	4.00	0.08	0.07	1.30
HC, ppmC.....	12.	5.	6.	794.	1008.	67.
NOx, ppm.....	1323.	1170.	1842.	1930.	1406.	537.
Air-fuel ratio.....	18.63	17.58	17.24	13.60	12.95	15.67
Emission rates, g/hr:						
CO.....	41.	127.	2436.	5586.	10224.	17.
HC.....	0.9	0.8	0.7	92.1	135.0	1.9
NOx*.....	298.3	321.6	634.4	631.9	531.7	43.2
Exhaust temperature, F....	1033.	1205.	1265.	1310.	1299.	861.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

PORE 300 CID

Engine.....	93	94	95	96	98	99
Test Number.....	7/ 8/77	7/ 8/77	7/ 8/77	7/ 8/77	7/11/77	7/11/77
Test Date.....	763.5	763.5	763.5	763.5	770.9	770.9
Barometer, in Hg.....	62.	64.	65.	65.	51.	55.
Humidity, grains/lb.....	71.	71.	71.	71.	79.	81.
Ambient temperature, F....	2000.	2000.	2000.	2000.	2000.	2000.
Engine speed, ipm.....	20.7	44.6	63.9	84.3	112.7	143.5
Torque, lb-ft.....	7.8	17.0	24.3	32.1	42.7	54.5
Power, bhp.....	10.5	12.8	15.5	18.0	22.4	28.2
Fuel rate, lb/hr.....	43.0	42.5	41.0	38.0	29.0	20.0
Ignition timing, deg BTC..	-22.7	-19.6	-17.2	-14.7	-10.8	-7.5
Manifold vacuum, in Hg....	11.5	14.5	17.0	20.0	24.5	30.0
Throttle angle, deg.....	1.332	0.756	0.635	0.561	0.524	0.517
Brake specific fuel const.	209.	212.	214.	214.	219.	223.
Oil temperature, F.....	58.	59.	59.	59.	58.	58.
Oil pressure, psi.....	210.	209.	209.	209.	209.	209.
Coolant temperature, F.....	1006.	1051.	1086.	1121.	1212.	1311.
Before Catalyst	5.1	9.2	12.6	16.9	25.8	38.3
Exhaust temperature, F....						
Exhaust pressure, in H2O..						
After catalyst						
Concentrations, dry basis:						
CO, %.....	0.028	0.033	0.030	0.035	0.033	0.030
CO2, %.....	13.43	13.37	13.54	13.68	14.08	14.10
O2, %.....	2.16	2.10	1.69	1.38	0.60	0.11
HC, ppmC.....	36.	30.	57.	57.	78.	264.
NOx, ppm.....	671.	1198.	1585.	1713.	1459.	1690.
Alt-fuel ratio.....	16.33	16.29	15.97	15.73	15.16	14.53
Emission rates, q/hr:						
CO.....	20.	28.	30.	40.	45.	1099.
HC.....	1.4	1.5	3.3	3.8	6.2	25.5
NOx..	76.7	167.7	262.1	324.8	331.4	462.3
Exhaust temperature, F....	926.	976.	1016.	1052.	1169.	1284.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

FORD 300 CID

Engine.....	100	7/11/77	102	6/28/77	6/28/77	43	40
Test Number.....							
Test Date.....	7/11/77	7/12/77	6/28/77	6/28/77	6/28/77	6/29/77	6/29/77
Barometer, in Hg.....	763.0	770.1	763.5	764.0	763.3	756.4	
Humidity, grains/lb.....	57.	72.	77.	80.	85.	89.	
Ambient temperature, F....	82.	77.	85.	86.	87.	87.	
Engine speed, rpm.....	2000.	2000.	2500.	2500.	2500.	2500.	2500.
Torque, lb-ft.....	179.1	219.8	0.3	19.3	38.5	60.7	60.7
Power, bhp.....	68.1	83.5	0.1	9.1	18.4	29.0	29.0
Fuel rate, lb/hr.....	35.1	44.1	10.0	13.0	15.9	19.1	19.1
Ignition timing, deg BIC..	14.0	14.5	43.5	44.0	44.0	44.0	44.0
Manifold vacuum, in Hg....	-5.3	-1.5	-24.5	-22.4	-18.6	-17.4	-17.4
Throttle angle, deg.....	37.0	80.0	11.0	15.0	17.0	20.0	20.0
Brake specific fuel const.	0.515	0.528	117.700	1.420	0.863	0.658	0.658
Oil temperature, F.....	227.	229.	223.	225.	227.	229.	229.
Oil pressure, psi.....	57.	57.	49.	49.	49.	57.	57.
Coolant temperature, F.....	209.	209.	209.	210.	210.	210.	210.
Before Catalyst							
Exhaust temperature, F....	1402.	1387.	1033.	1073.	1035.	1145.	1145.
Exhaust pressure, in H2O..	55.6	72.5	5.2	9.0	13.3	19.2	19.2
After Catalyst							
Concentrations, dry basis:							
CO, %.....	2.023	4.082	0.014	0.027	0.028	0.029	0.029
CO2, %.....	13.38	12.23	11.16	11.14	11.22	13.58	13.58
O2, %.....	0.12	0.13	5.17	5.24	4.96	1.61	1.61
HC, ppmC.....	615.	1052.	4.	0.	0.	41.	41.
NOx, ppm.....	1768.	1660.	353.	698.	1151.	1931.	1931.
Air-fuel ratio.....	13.94	13.10	19.31	19.37	19.09	15.91	15.91
Emission rates, g/hr:							
CO.....	4030.	9645.	11.	28.	35.	36.	36.
HC.....	71.1	144.4	0.2	0.0	0.0	2.9	2.9
NOx**.....	578.6	644.4	46.1	119.1	236.2	392.2	392.2
Exhaust temperature, F....	1348.	1323.	945.	998.	985.	1094.	1094.

* Corrected - SAE J245 Spark Ignition engine rating code

** Corrected for humidity

FORE 300 CID							
Engine	45	46	47	48	49	103	
Test Number	6/29/77	6/29/77	6/29/77	6/29/77	6/29/77	7/12/77	
Test Date	755.7	754.9	755.4	755.1	754.9	770.1	
Barometer, mm Hg	90.	94.	94.	101.	94.	81.	
Humidity, grains/lb.	88.	90.	92.	92.	90.	78.	
Ambient temperature, F.							
Engine speed, rpm	2500.	2500.	2500.	2500.	2500.	2500.	
Torque, lb-ft	81.6	111.5	142.1	175.3	198.0	2.0	
Power, bhp	39.0	53.5	68.3	83.7	94.8	0.9	
Fuel rate, lb/hr	22.6	28.5	36.6	47.8	53.3	10.4	
Ignition timing, deg BTC	42.0	32.0	22.0	35.0	32.0	44.0	
Manifold vacuum, in Hg	-14.9	-10.8	-6.7	-4.1	-2.2	-24.7	
Throttle angle, deg	23.5	27.0	37.0	47.0	80.0	11.0	
Brake specific fuel cons.	0.580	0.531	0.536	0.571	0.562	11.290	
Oil temperature, F	232.	235.	238.	241.	243.	216.	
Oil pressure, psi	57.	57.	56.	56.	56.	59.	
Coolant temperature, F	207.	211.	211.	208.	210.	211.	
Before Catalyst							
Exhaust temperature, F	1199.	1270.	1388.	1398.	1415.	1034.	
Exhaust pressure, in H2O	26.4	39.7	61.7	86.3	102.5	5.3	
After Catalyst							
Concentrations, dry basis:							
CO, %	0.030	0.558	2.008	4.703	4.895	6.027	
CO2, %	14.07	14.29	13.60	11.89	11.79	13.15	
O2, %	0.94	0.24	0.21	0.21	0.19	2.10	
HC, ppmC	52.	270.	847.	1043.	1014.	16.	
NOx, ppm	2000.	1919.	1726.	1148.	1362.	495.	
Air-fuel ratio	15.40	14.66	13.99	12.92	12.84	16.32	
Emission rates, g/hr:							
CO	43.	945.	4181.	11879.	13712.	19.	
HC	4.2	26.5	102.7	153.1	165.0	0.6	
NOx	465.4	533.6	590.5	476.4	626.8	56.6	
Exhaust temperature, F	1166.	1259.	1337.	1351.	1367.	934.	

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

FORD 300 CID						
Engine.....	104	105	106	107	109	110
Test Number.....	7/12/77	7/12/77	7/12/77	7/12/77	7/13/77	7/13/77
Test Date.....	770.9	770.9	770.9	770.1	765.6	765.8
Barometer, mm Hg.....	83.	80.	78.	86.	100.	94.
Humidity, grains/lb.....	78.	78.	78.	80.	84.	85.
Ambient temperature, F....						
Engine speed, rpm.....	2500.	2500.	2500.	2500.	2500.	2500.
Torque, lb-ft.....	18.3	38.8	57.8	77.6	109.3	139.7
Power, bhp.....	8.7	18.5	27.6	37.0	52.2	66.6
Fuel rate, lb/hr.....	13.1	16.0	19.0	22.0	28.0	36.4
Ignition timing, deg BTC..	44.5	43.0	44.0	41.0	35.0	20.5
Manifold vacuum, in Hg....	-22.8	-20.7	-18.3	-15.9	-11.6	-7.1
Throttle angle, deg.....	14.0	17.0	20.0	22.0	26.5	35.0
Brake specific fuel consp.	1.498	0.865	0.688	0.595	0.538	0.546
Oil temperature, F.....	220.	223.	226.	228.	231.	234.
Oil pressure, psi.....	59.	55.	58.	58.	57.	56.
Coolant temperature, F.....	209.	208.	209.	208.	212.	210.
Before Catalyst						
Exhaust temperature, F....	1078.	1107.	1137.	1181.	1253.	1382.
Exhaust pressure, in H2O..	8.4	12.9	18.2	24.6	37.3	59.2
After Catalyst						
Concentrations, dry basis:						
CO, %.....	0.028	0.030	0.033	0.031	0.369	1.708
CO2, %.....	13.14	13.35	13.62	14.03	14.45	13.69
O2, %.....	2.03	1.70	1.35	0.87	0.07	0.03
HC, ppm.....	22.	36.	26.	42.	150.	687.
NOx, ppm.....	834.	1576.	1872.	2009.	2034.	1867.
Air-fuel ratio.....	16.27	15.99	15.72	15.36	14.64	14.01
Emission rates, g/hr:						
CO.....	25.	32.	40.	43.	615.	3540.
HC.....	1.1	2.1	1.8	3.4	14.5	82.8
NOx**.....	119.2	270.6	373.8	454.2	556.5	635.7
Exhaust temperature, F....	996.	1040.	1079.	1137.	1240.	1328.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

POBE 300 CID

Engine.....	111	125	51	52	53	54
Test Number.....	7/13/77	7/19/77	6/30/77	6/30/77	6/30/77	6/30/77
Test Date.....						
Barometer, mm Hg.....	765.0	763.5	761.0	761.0	761.0	761.0
Humidity, grains/lb.....	96.	87.	62.	63.	62.	62.
Ambient temperature, F....	84.	90.	84.	83.	83.	83.
Engine speed, rpm.....	2500.	2500.	3000.	3000.	3000.	3000.
Torque, lb-ft.....	204.8	170.0	0.5	15.6	35.2	51.8
Power, bhp.....	97.5	81.1	0.3	8.9	20.0	29.5
Fuel rate, lb/hr.....	53.6	43.8	12.7	15.4	19.1	22.4
Ignition timing, deg BTC..	16.0	16.0	46.0	46.0	46.0	45.0
Manifold vacuum, in Hg....	-2.3	-4.5	-24.2	-22.7	-20.4	-18.4
Throttle angle, deg.....	80.0	44.0	14.0	16.5	20.0	22.0
Brake specific fuel const.	0.550	0.540	47.470	1.741	0.951	0.761
Oil temperature, F.....	238.	235.	232.	233.	235.	238.
Oil pressure, psi.....	56.	57.	59.	59.	58.	58.
Coolant temperature, F....	213.	212.	211.	210.	211.	211.
Before Catalyst						
Exhaust temperature, F....	1431.	1429.	1089.	1126.	1162.	1191.
Exhaust pressure, in H2O..	104.9	79.8	8.1	12.0	18.2	24.5
After Catalyst						
Concentrations, dry basis:						
CO, %.....	4.703	2.729	0.032	0.026	0.027	0.029
CO2, %.....	11.98	13.14	13.21	13.42	13.64	14.04
O2, %.....	0.02	0.07	2.18	1.85	1.50	0.98
HC, ppmC.....	915.	733.	13.	20.	25.	36.
NOx, ppm.....	1456.	1678.	566.	1142.	1700.	1825.
Air-fuel ratio.....	12.83	13.63	16.37	16.11	15.83	15.44
Emission rates, g/hr:						
CO.....	13222.	6632.	27.	27.	33.	41.
HC.....	149.6	103.6	0.6	1.2	1.7	2.9
NOx**.....	672.5	670.0	78.9	190.0	343.8	422.1
Exhaust temperature, F....	1376.	1366.	994.	1044.	1099.	1146.

* Corrected - SAE J245 Spark ignition engine rating code

** Corrected for humidity

POBD 300 CID							
Engine.....	55	56	57	58	59	112	
Test Number.....	6/30/77	6/30/77	6/30/77	6/30/77	6/30/77	7/13/77	
Test Date.....							
Barometer, in Hg.....	761.0	761.0	761.5	761.5	762.0	764.8	
Humidity, grains/lb.....	61.	60.	63.	58.	56.	96.	
Ambient temperature, F....	84.	85.	87.	90.	93.	83.	
Engine speed, rpm.....	3000.	3000.	3000.	3000.	3000.	3000.	
Torque, lb-ft.....	69.2	94.8	120.5	146.9	174.7	0.7	
Power, bhp.....	39.3	54.1	68.9	84.0	99.8	0.4	
Fuel rate, lb/hr.....	26.3	31.8	38.3	48.7	59.5	13.0	
Ignition timing, deg ETC..	45.0	38.0	30.0	25.0	39.0	21.0	
Manifold vacuum, in Hg....	-16.1	-12.7	-9.3	-4.8	-3.0	-24.1	
Throttle angle, deg.....	25.0	29.0	35.0	47.0	80.0	14.0	
Brake specific fuel cons*.	0.670	0.588	0.556	0.580	0.597	36.580	
Oil temperature, F.....	242.	245.	248.	249.	252.	230.	
Oil pressure, psi.....	58.	57.	57.	57.	56.	58.	
Coolant temperature, F.....	212.	212.	210.	210.	210.	211.	
Before Catalyst							
Exhaust temperature, F....	1219.	1271.	1337.	1463.	1432.	1111.	
Exhaust pressure, in H2O..	33.5	47.8	65.5	99.8	125.1	8.9	
After Catalyst							
Concentrations, dry basis:							
CO, %.....	0.043	0.381	1.316	2.573	3.855	0.034	
CO2, %.....	14.34	14.38	13.81	13.17	11.62	13.37	
O2, %.....	0.44	0.19	0.22	0.12	0.10	1.86	
HC, ppmC.....	55.	154.	620.	682.	938.	16.	
NOx, ppm.....	1843.	1746.	1772.	1331.	782.	649.	
Air-fuel ratio.....	15.05	14.72	14.29	13.72	13.10	16.12	
Emission rates, g/hr:							
CO.....	70.	723.	2927.	6999.	12371.	25.	
HC.....	5.1	17.0	80.2	107.9	173.6	0.8	
NOx*.....	487.5	544.7	647.6	594.8	412.0	90.9	
Exhaust temperature, F....	1207.	1276.	1299.	1412.	1387.	1015.	

* Corrected - SAE J245 Spark Ignition engine rating code

** Corrected for humidity

FORD 300 CID									
Engine.....	113	115	116	117	119	120			
Test Number.....	7/13/77	7/14/77	7/14/77	7/14/77	7/18/77	7/18/77			
Test Date.....	764.5	766.8	766.6	766.6	764.8	765.0			
Barometer, mm Hg.....	100.	73.	75.	78.	89.	89.			
Humidity, grains/lb.....	85.	80.	84.	88.	84.	88.			
Ambient temperature, F.....									
Engine speed, rpm.....	3000.	3000.	3000.	3000.	3000.	3000.			
Torque, lb-ft.....	16.6	31.8	49.9	67.9	119.9	147.4			
Power, bhp.....	9.5	18.1	28.5	38.7	68.4	84.1			
Fuel rate, lb/hr.....	15.7	18.7	22.1	26.1	38.9	49.9			
Ignition timing, deg BTC.....	7.0	45.0	57.0	44.0	30.0	19.0			
Manifold vacuum, in Hg.....	-22.5	-20.9	-18.8	-16.5	-9.3	-4.6			
Throttle angle, deg.....	16.0	19.0	21.0	24.0	34.0	47.0			
Brake specific fuel consg.....	1.661	1.033	0.775	0.673	0.569	0.593			
Oil temperature, F.....	232.	233.	235.	240.	244.	246.			
Oil pressure, psi.....	58.	59.	59.	58.	57.	57.			
Coolant temperature, F.....	211.	209.	210.	209.	211.	212.			
Before Catalyst									
Exhaust temperature, F.....	1136.	1160.	1199.	1220.	1341.	1454.			
Exhaust pressure, in H2O.....	12.7	16.6	23.6	32.3	65.2	100.8			
After Catalyst									
Concentrations, dry basis:									
CO, %.....	0.027	0.028	0.033	0.037	1.686	2.558			
CO2, %.....	13.64	13.59	13.90	14.38	13.75	13.07			
O2, %.....	1.58	1.38	0.89	0.40	0.08	0.03			
HC, ppmC.....	16.	27.	21.	56.	701.	753.			
NOx, ppm.....	1370.	1729.	1862.	1951.	1958.	1422.			
Air-fuel ratio.....	15.89	15.75	15.38	15.02	14.05	13.50			
Emission rates, g/hr:									
CO.....	27.	33.	45.	60.	3743.	8223.			
HC.....	0.9	1.8	1.7	5.2	90.6	120.3			
NOx.....	229.0	341.4	422.9	509.7	714.1	640.8			
Exhaust temperature, F.....	1055.	1095.	1153.	1217.	1290.	1397.			

* Corrected - SAE J245 Spark Ignition engine rating code

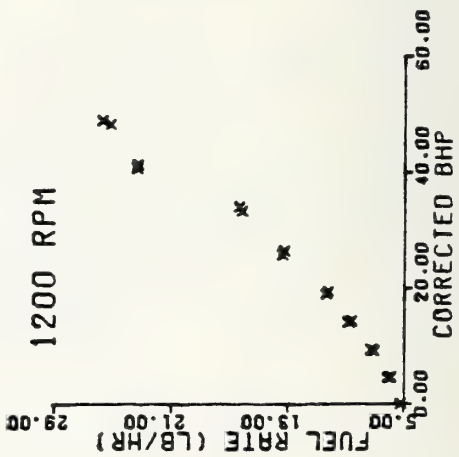
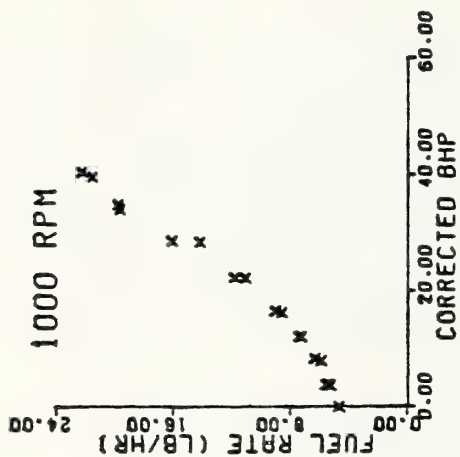
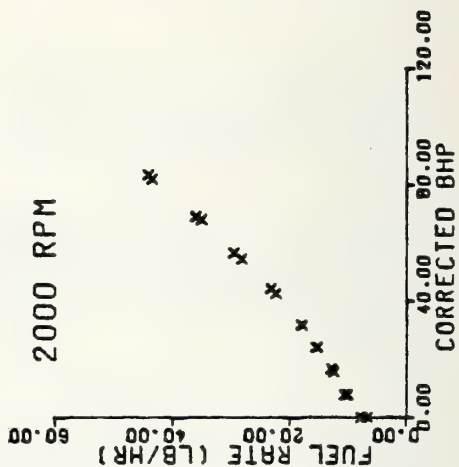
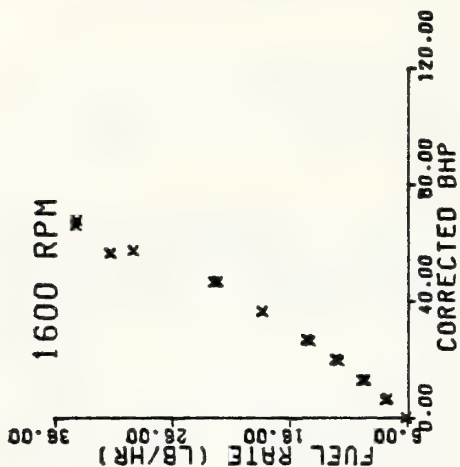
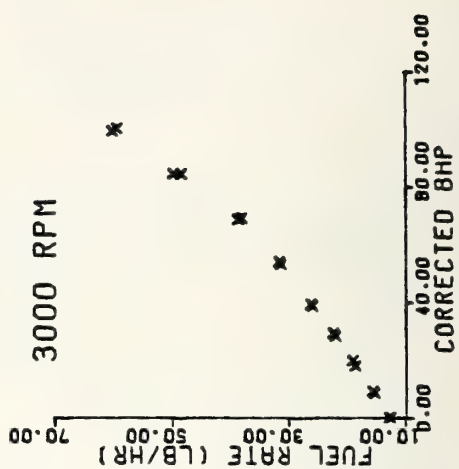
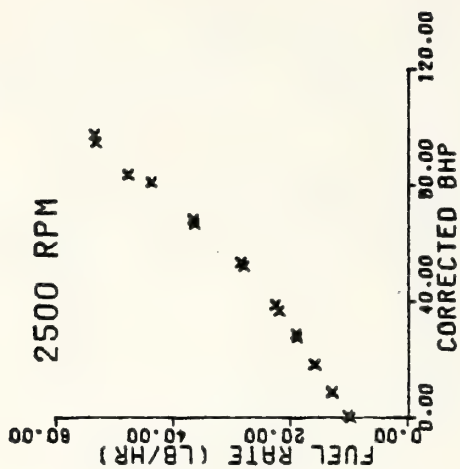
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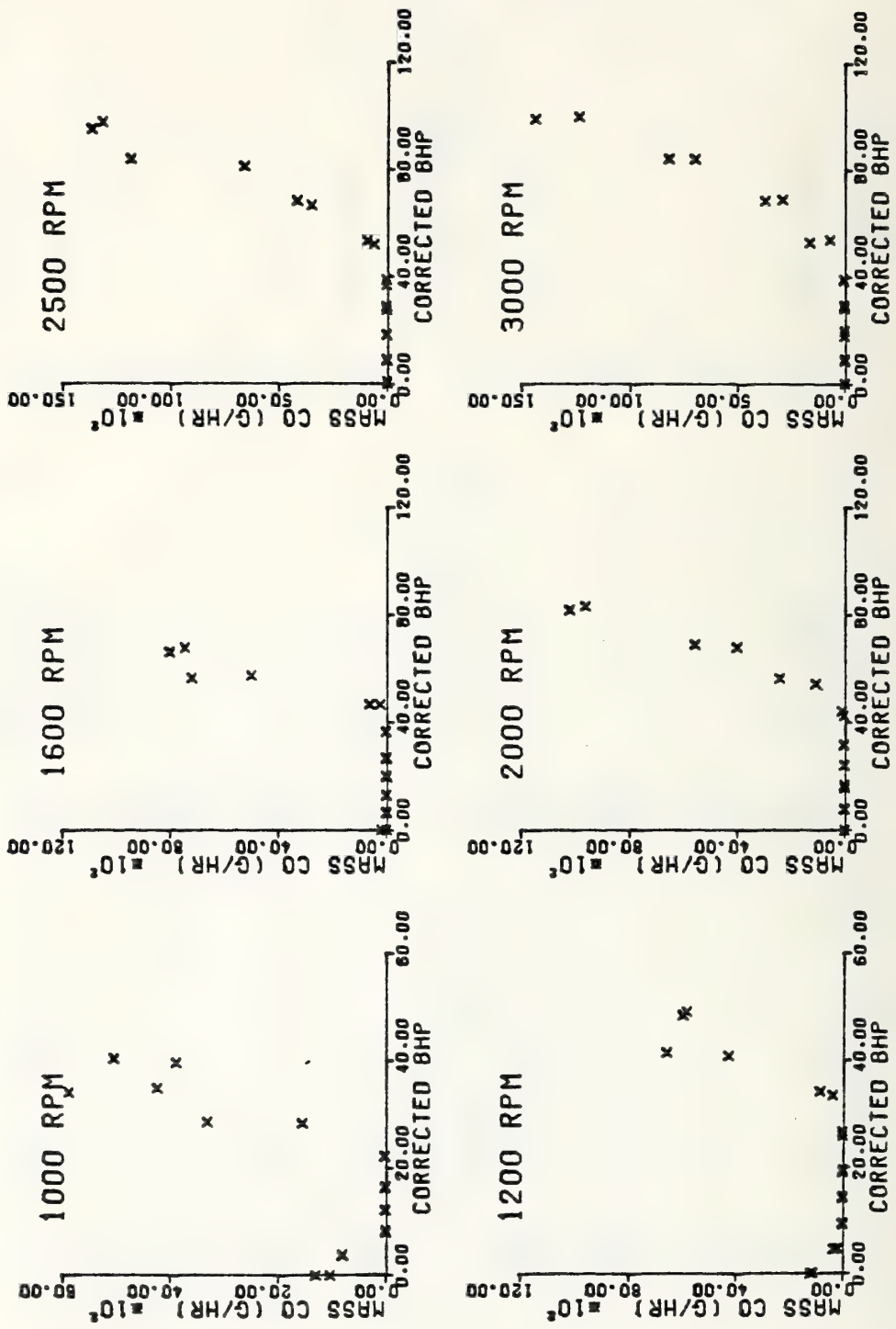
Engine.....	POSD 300 CID	
Test Number.....	121	128
Test Date.....	7/18/77	7/20/77
Barometer, mm Hg.....	765.0	762.3
Humidity, grains/lb.....	93.	98.
Ambient temperature, F.....	89.	85.
Engine speed, rpm.....	3000.	3000.
Torque, lb-ft.....	172.9	92.8
Power, bhp.....	98.8	52.9
Fuel rate, lb/hr.....	60.3	31.5
Ignition timing, deg ETC..	21.0	39.0
Manifold vacuum, in Hg.....	-3.0	-13.3
Throttle angle, deg.....	80.0	27.0
Brake specific fuel cons*.	0.611	0.596
Oil temperature, F.....	248.	241.
Oil pressure, psi.....	57.	58.
Coolant temperature, F.....	212.	211.
Before Catalyst		
Exhaust temperature, F.....	1030.	1261.
Exhaust pressure, in H2O..	124.2	44.6
After Catalyst		
Concentrations, dry basis:		
CO, %.....	4.531	0.902
CO2, %.....	11.63	13.97
O2, %.....	0.01	0.22
HC, ppmC.....	881.	443.
NOx, ppm.....	871.	2098.
Air-fuel ratio.....	12.83	14.48
Emission rates, q/hr:		
CO.....	14410.	1674.
HC.....	162.2	47.7
NOx**.....	454.8	639.7
Exhaust temperature, F....	1381.	1238.

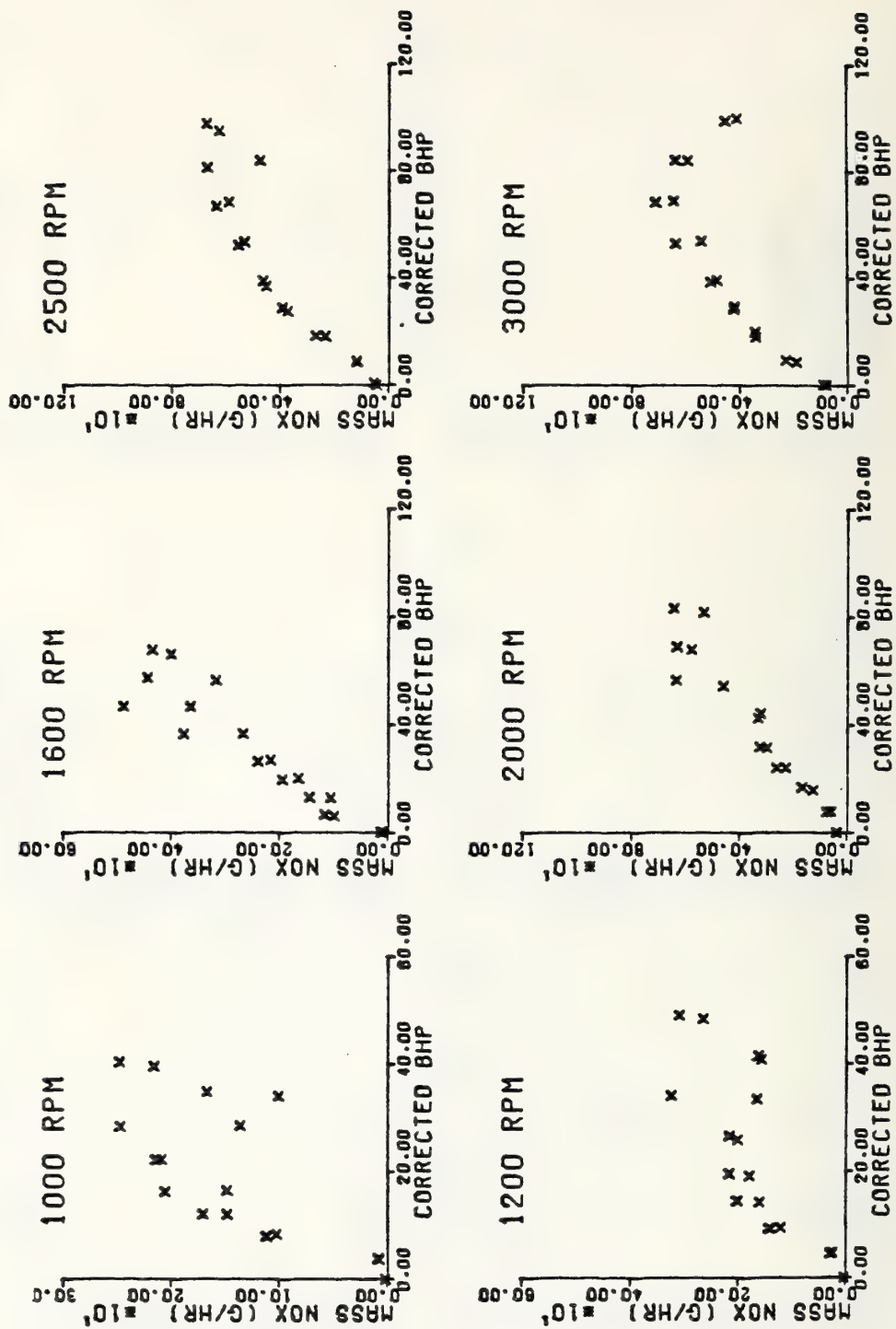
* Corrected - SAE J245 Spark ignition engine rating code

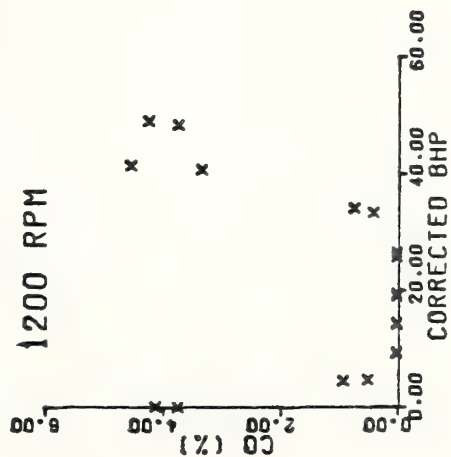
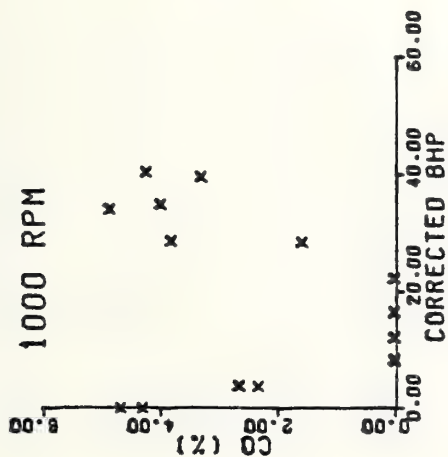
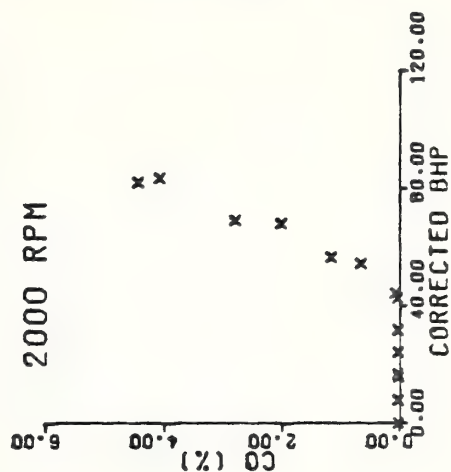
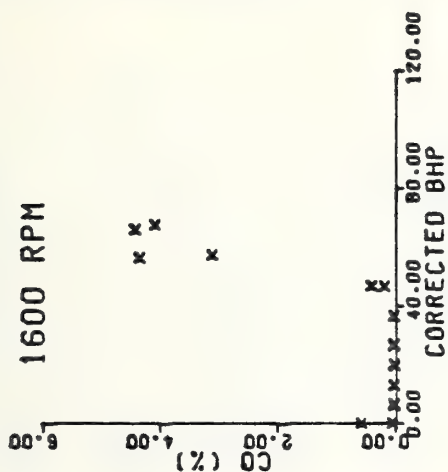
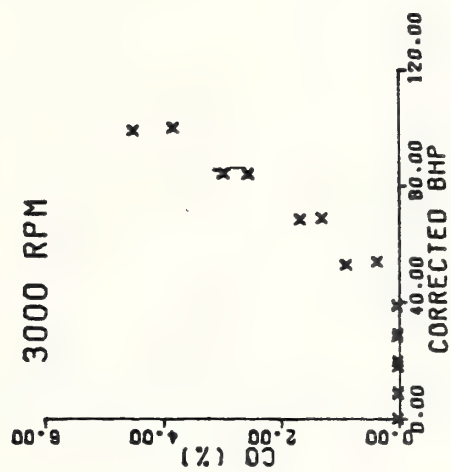
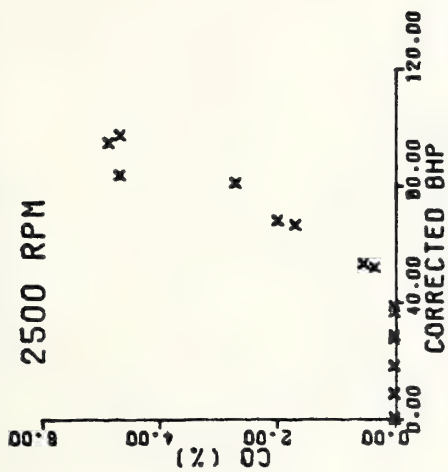
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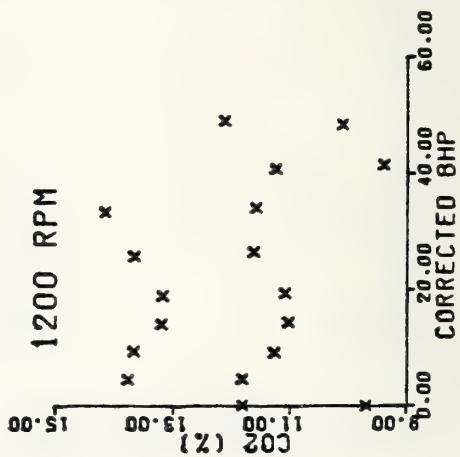
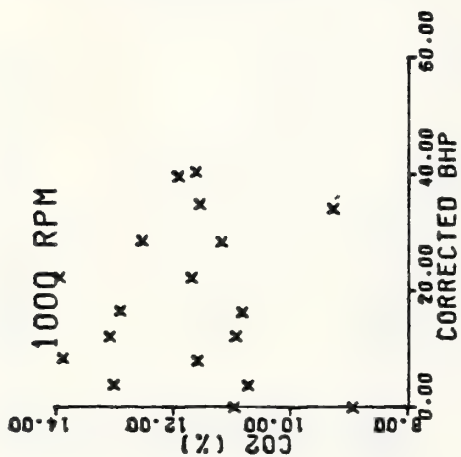
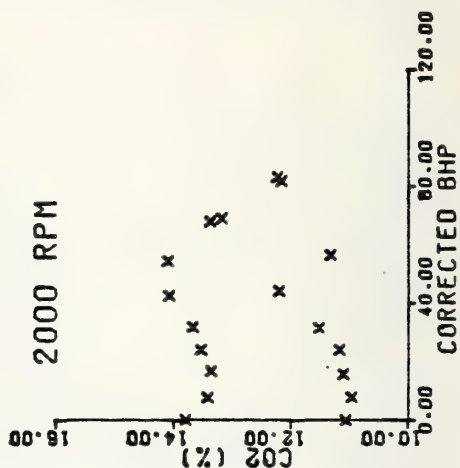
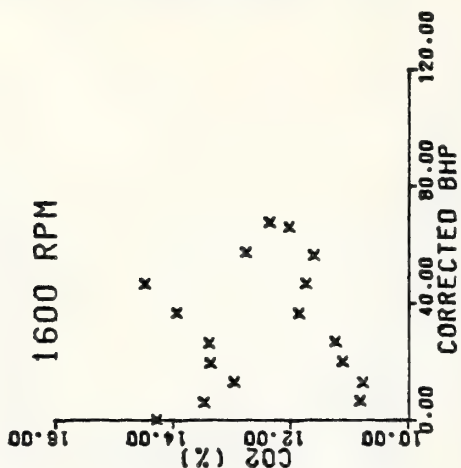
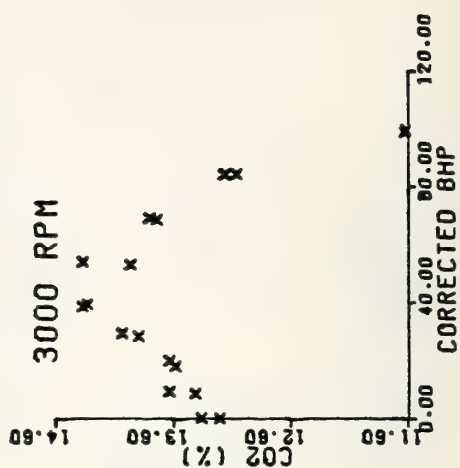
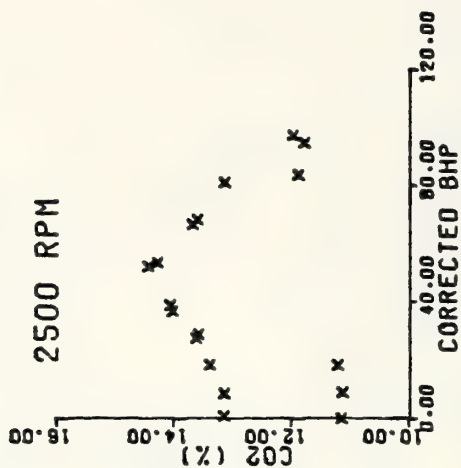
APPENDIX B GRAPHICAL SUMMARY OF ENGINE MAP DATA

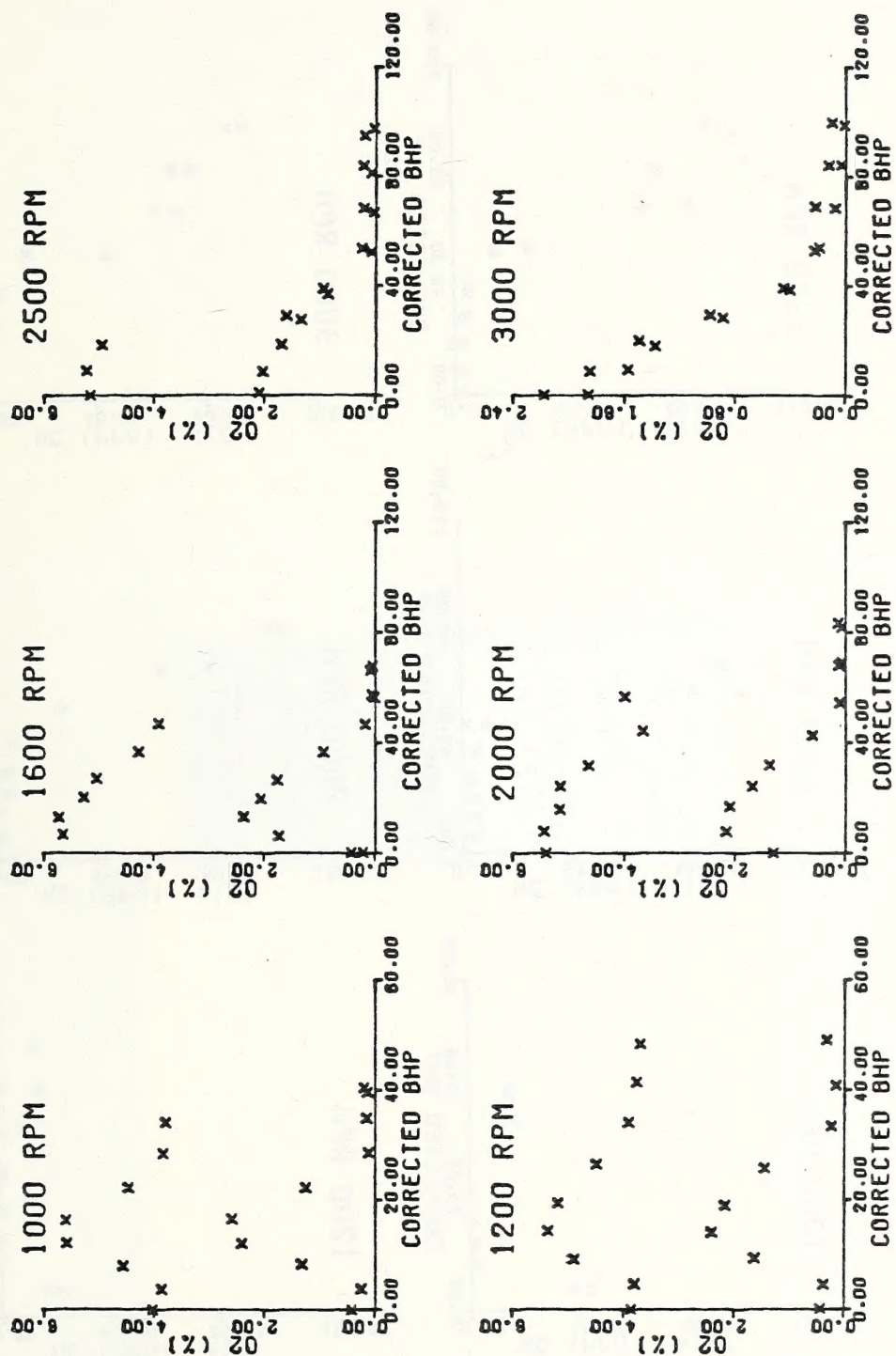


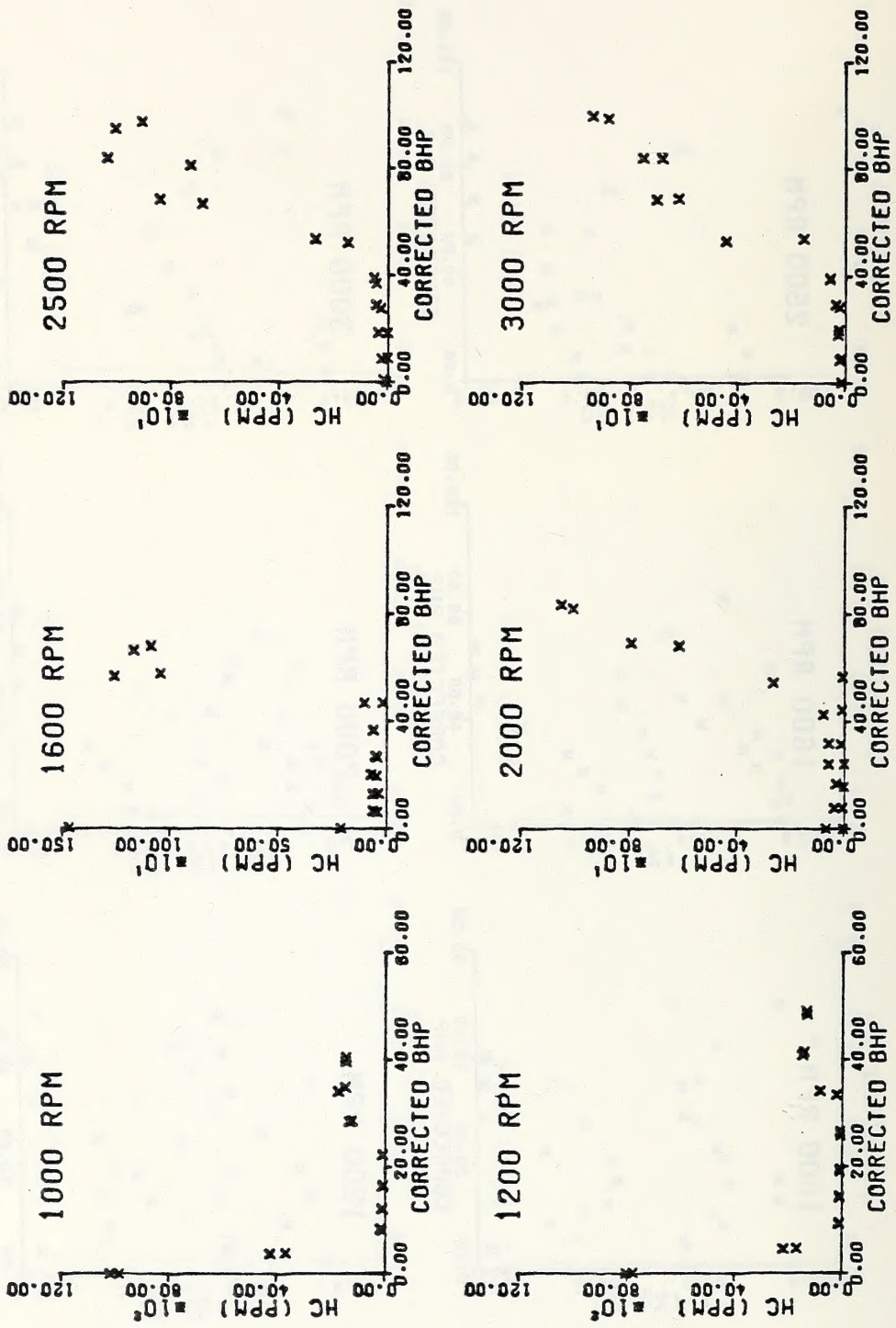












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